DECLARATION OF DR. JONATHAN PHILLIPS

For: VERIFICATION OF POWER GENERATION BASED ON DR. RANDELL L. MILLS' HYDRINO TECHNOLOGY

I, Jonathan Phillips, residing at 700 Avenida Castellano, Santa Fe, New Mexico, declare and state that:

1. I received a Bachelor of Arts degree in physics from Middlebury College, Middlebury, Vermont, in 1976, and a Masters of Science and Doctorate degrees in Materials Science at the University of Wisconsin, Madison, Wisconsin, in 1977and 1981, respectively.

2. I have been a national lab professor at the University of New Mexico in the Department of Chemical and Nuclear Engineering since March 1999.

3. I am a technical staff member at Los Alamos National Lab, Los Alamos, New Mexico, where I serve as project leader on a material aging project.

4. I am currently on a two year leave of absence from my position as a full Professor of Chemical Engineering at the Pennsylvania State University, University Park, Pennsylvania, where I have been a member of the faculty since 1982.

5. I have published over 70 peer-reviewed scientific papers, and have conducted research for over 23 years in various areas, including multimetallic catalytic chemistry and structure, catalytic etching, carbon surface chemistry, plasma physics and chemistry, materials modification by plasmas, as well as microcalorimety and Mossbauer spectroscopy. My research is currently supported by the U.S. National Science Foundation, the U.S. Department of Energy, and individual corporations through the NSF center for Ceramic and Composite Materials co-located at the University of New Mexico and Rutgers University.

6. I was a Fulbright Fellow at the Ben Gurion University of the Negev in 1997-98.

7. Experiments were conducted to test the hypothesis that in the gas phase potassium ions will catalyze the conversion of hydrogen atoms to hydrino atoms. These experiments were initially carried out in a Calvet cell as this type of calorimeter is highly sensitive and accurate. Moreover, the conditions of the calorimeter are controlled.

8. Dr. Randell L. Mill's theory of hydrino formation requires a catalyst, such as two gaseous K+ ions, and H-atoms. In order to generate gaseous K+ ions, KNO_3 was placed in a small (2cc) quartz 'boat' inside the calorimeter cell. The boat was heated, to increase the vapor concentration of KNO_3, with a platinum filament, which

was wound around the boat. A second function of the platinum filament was to generate H-atoms. It is well known that hydrogen molecules in contact with a heated filament will decompose, yielding a relatively high H-atom concentration in the boundary layer around the filament. Thus, according to Dr. Mills' model, in a cell containing KNO_3 in the boat and vapor phase hydrogen, there is a small region in the boundary layer around the heated metal filament which should contain sufficient concentrations of both H-atoms and K+ ions for hydrino formation to occur.

9. Calorimetric considerations require that a stable baseline exists before the heat generating process is initiated. Thus, signal change away from the baseline can be correlated to the onset of the process under investigation. In the present experiments the cell was run with KNO_3 in the boat and the filament fully 'powered'. The calorimeter was allowed to equilibrate until a steady baseline existed. The 'hydrino formation' process was initiated by then adding gaseous hydrogen.

10. In the present experiment, data was obtained which indicates that heat evolved upon the introduction of hydrogen to the Calvet calorimeter cell. In contrast, no heat was evolved upon the admission of helium. Repeated calibrations were also conducted. Thus, it appears that the Dr. Mills' hypothesis is consistent with the present results.

EXPERIMENTAL SYSTEM

11. Calvet Calorimeter. The Calvet-type calorimeter employed in this study was similar to one described in my earlier reports to Hydrocatalysis Corporation (now BlackLight Power, Inc.), entitled "Additional Calorimetric Examples of Anomalous Heat From Physical Mixture of K/Carbon and Pd/Carbon," January 1, 1996. In essence a stainless steel cup of almost exactly 20 cm^3 volume was placed in a calorimeter well such that the cup is surrounded by thermopiles on its sides and bottom. The cup and calorimeter are surrounded by a thick layer of insulation, and the entire device is placed inside a commercial convection oven. In all cases experiments were conducted with the oven temperature set to 250°C.

12. Reaction cell. For these experiments the top of the calorimeter cup/reactor cell was fitted with a Conflat knife edge flange. The top element of the flange is connected to a gas supply system outside the convection oven with a 0.5 cm OD ss tube, and with two welded vacuum high current copper feedthroughs. The feedthroughs were connected on the cup side of the flange to a coiled section of 0.25 mm platinum wire approximately 18 cm in length. Fitted inside the coiled platinum was a small quartz boat into which 200 mg of powdered KNO_3 were placed.

13. Plumbing. On the outside of the oven the gas feed through is connected to a line

leading to hydrogen and helium tanks, a pressure gauge, and a standard vacuum roughing pump. It is notable that the gas lines were all well insulated, both inside the oven, and for about 50 cm outside the oven. The plumbing system was so arranged that the cell could be evacuated, and then isolated from the pump in such a way that hydrogen or helium could be added directly from high purity gas tanks. Great care was taken before the experiments were initiated to evacuate and flush the gas lines several times. It was also determined that the lines held gas pressure, with no loss in pressure, for several days. That is, there were no leaks.

RESULTS

14. Calvet Calorimeter. The Calvet studies suggest large amounts of heat are generated upon the admission of hydrogen to the cell. In contrast, virtually no heat is observed upon admission of helium to the cell.

15. Calibration. The first tests performed on the Calvet system were electrical calibration experiments. The system was set-up for full experimentation: KNO_3 was in the boat, the system was evacuated, and 10 watts of steady power were supplied to the platinum coil. After a steady baseline was achieved (approximately 10 hours after the oven was adjusted to 250°C), the cell was isolated from the pump and the pressure allowed to equilibrate (approximately 100 Torr). This did not appear to impact the baseline in any fashion. The power supply was then adjusted to deliver an additional 1 watt (11 watt rather than 10) for a specified time period. The power was then returned to the original 10 wall setting. A typical response curve is shown in Figure 1. The area under the response curve can be used to obtain a calibration constant which relates signal area increase to the number of extra Joules delivered. This was done in four cases (Table I). As can be seen, there is some error (+/-15%) in the calculated calibration constant.

16. Control Studies. Helium was admitted, approximately 10 psig, to the cell to test the impact of a change in pressure, and heat transfer characteristics on the response of the cell. The helium was admitted after the cell had been isolated from the pump for a considerable time and a steady pressure (approximately 100 Torr) achieved. As can be seen in Figure 2a, the response was a short-lived small increase in output signal, followed by a relatively short time period during which the signal gradually returns to the original baseline. Within an hour the signal returned to the original baseline, with some drift evident.

17. The response of the system was expected. The helium increased the rate of heat transfer away from the platinum filament, and heated boat. Thus, the initial addition of helium to the system resulted in a temporary increase in the amount of heat reaching the thermopiles. That is, the boat and the filament cool off; until such time as the boat and filament have reached their new steady state temperatures. The

steady state temperature of the boat and filament are a function of heat transfer mechanism. After the admission of helium most heat transfer was occurring by convection to the walls. Before the admission of helium a considerable fraction was by radiation. Radiative transfer of 10 watts requires a higher filament/boat temperature than does convective heat transfer.

18. Figure 2b illustrates again the impact of adding pressure, or removing gas, from the system. Upon the addition of helium there was a very short lived increase in heat reaching the thermopiles. Upon pumping there was a period of time, perhaps an hour, during which the heat signal went below the baseline. This is consistent with the model in that pumping makes convective and diffusive heat transfer minimal. Virtually all heat transfer was by radiation, which requires that the filament/boat temperature increase. It took some time for this new steady-state temperature to be reached.

19. Hydrogen Admission. Hydrogen admission was carried out in much the same fashion as helium admission. The cell reached an equilibrium pressure, approximately 100 Torr, and then hydrogen at 10 psig was admitted to the cell. The valve to the hydrogen source, which was a steel line 4 meters by 0.6 cm OD, was closed off by a valve in front of the regulator during admission. Moreover, it was open for only a couple of seconds in each case. This was done on three separate occasions, and the signal that evolved in response to these three processes was recorded in Figures 3, 4 and 5. One other observation recorded was that the pressure decreased gradually over time, such that after about an hour the pressure returned to the original equilibrium pressure of the cell. It must also be noted that the heat production was ended deliberately in all three cases by pumping the system to 5×10^{-3} Torr. It is clear 'excess heat' evolution would have continued in all cases if the system had not been evacuated.

20. It was expected that in the absence of reaction that the response of the cell to the addition of hydrogen would be similar to that observed for helium. Indeed, given that pressure measurements suggest that most hydrogen was adsorbed, or in some other fashion removed from the cell after an hour, even heat transfer effects should be totally transitory. Even in the event of reaction no more than a small heat signal was expected. Indeed, a high end estimate is that 25 cm^3 of hydrogen at a temperature of 300°K and a pressure of 2 atmospheres entered the cell. This is equivalent to 2×10^{-3} moles of hydrogen. If all of that hydrogen interacted with oxygen to form water only 510 J would be generated. It is possible to imagine that the hydrogen could interact with nitrogen in the KNO_3 to form ammonia. However, even less energy would evolve from this process. Thus, the largest heat peak expected was 0.5 watts for 1000 seconds (approx. 17 minutes). A block of this size is marked on Figure 3.

21. It is clear from figures 3, 4 and 5 that hydrogen admission to the cell produced far

more energy evolution than can be explained by any conventional chemical process. It is interesting in this regard to graphically contrast the response of the system to helium admission to the response to that for hydrogen admission. This is done on Figure 6 in which Figure 3 and Figure 2a are superimposed.

DISCUSSION

22. The evidence presented in this report clearly suggests that a phenomenon takes place upon the admission of hydrogen to a cell containing a heated platinum filament and KNO_3. This phenomenon appears to generate heat in excess of that expected from any known chemical process, given the content of the reactants in the cell.

23. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

By _____
Dr. Jonathan Phillips

Date: July 20, 2000

Typical Calibration Experiment: 1 W Input, 20 Mins

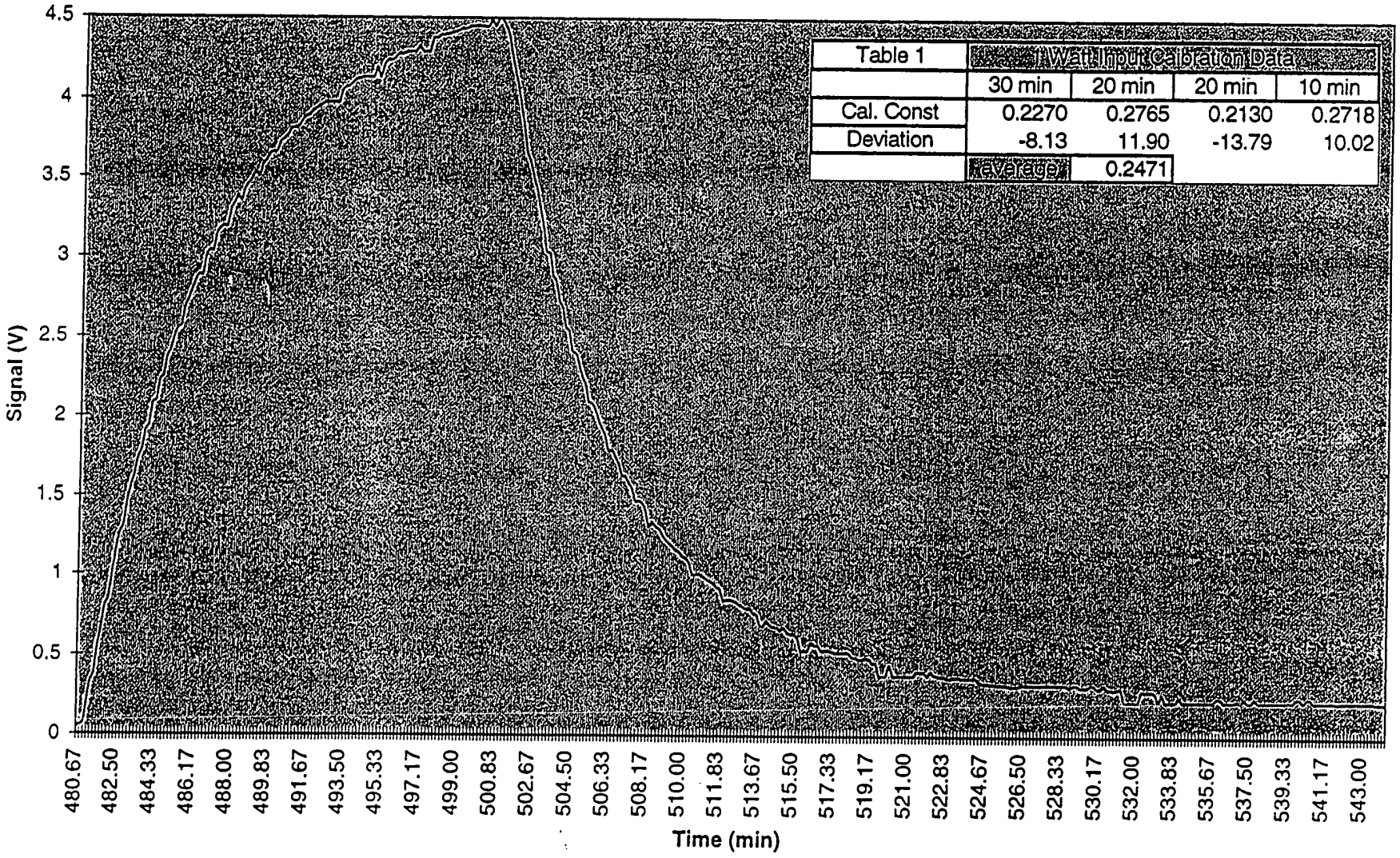


Table 1	1 Watt Input Calibration Data			
	30 min	20 min	20 min	10 min
Cal. Const	0.2270	0.2765	0.2130	0.2718
Deviation	-8.13	11.90	-13.79	10.02
	Average	0.2471		

Figure 1

Heat Production, KNO3 w/ Helium Injection (BL1220A)

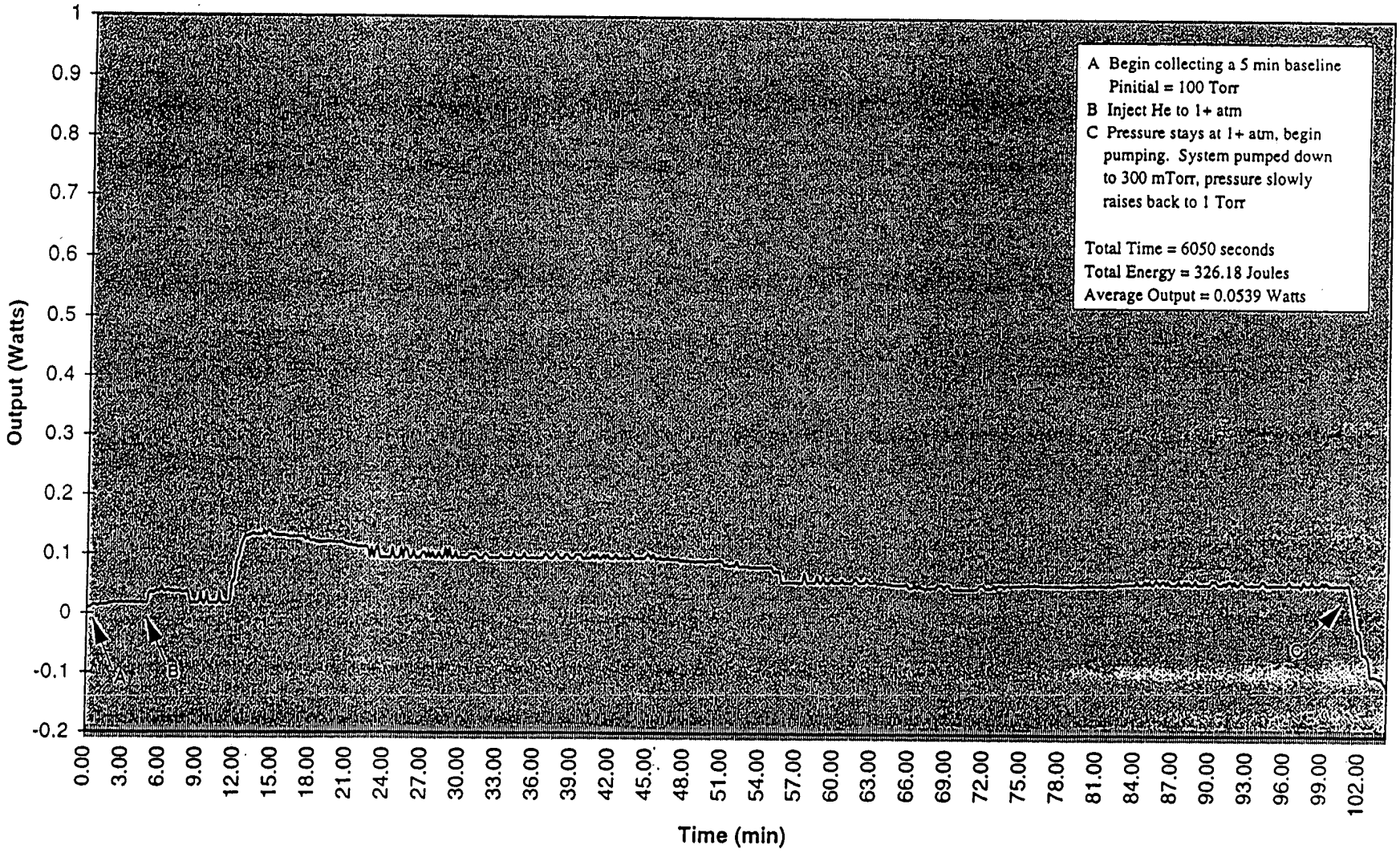


Figure 2A

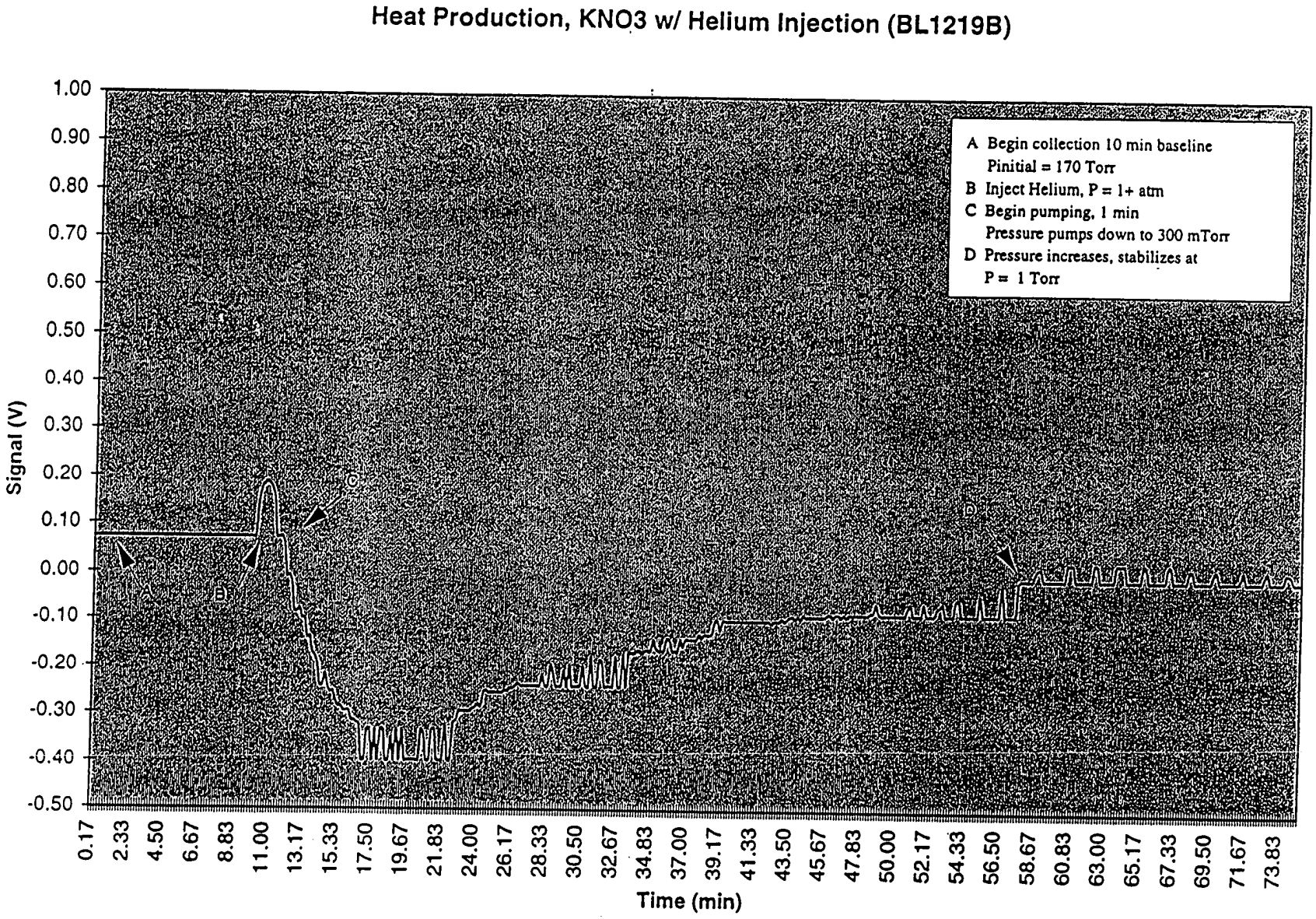
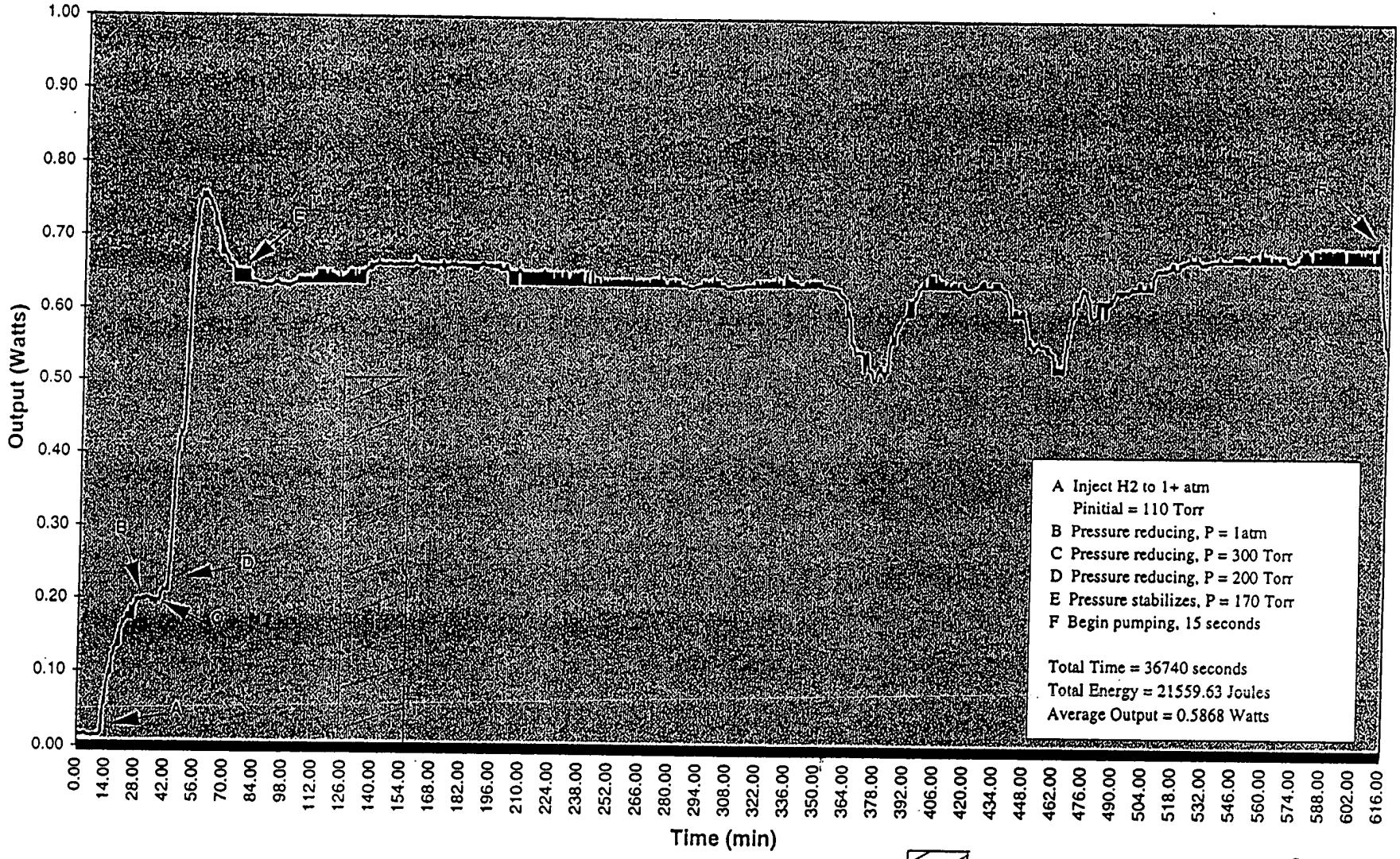

Heat Production, KNO3 w/ Helium Injection (BL1219B)
A Begin collection 10 min baseline
Pinitial = 170 Torr
B Inject Helium, P = 1+ atm
C Begin pumping, 1 min
Pressure pumps down to 300 mTorr
D Pressure increases, stabilizes at
P = 1 Torr
Signal (V)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
0.17
2.33
4.50
6.67
8.83
11.00
13.17
15.33
17.50
19.67
21.83
24.00
26.17
28.33
30.50
32.67
34.83
37.00
39.17
41.33
43.50
45.67
47.83
50.00
52.17
54.33
56.50
58.67
60.83
63.00
65.17
67.33
69.50
71.67
73.83
Time (min)

Figure 2B

Heat Production, KNO3 w/ H2 Injection (BL1218CD)



▨ – Peak area expected if all admitted H_2 reacts with O_2 to form H_2O.

Figure 3

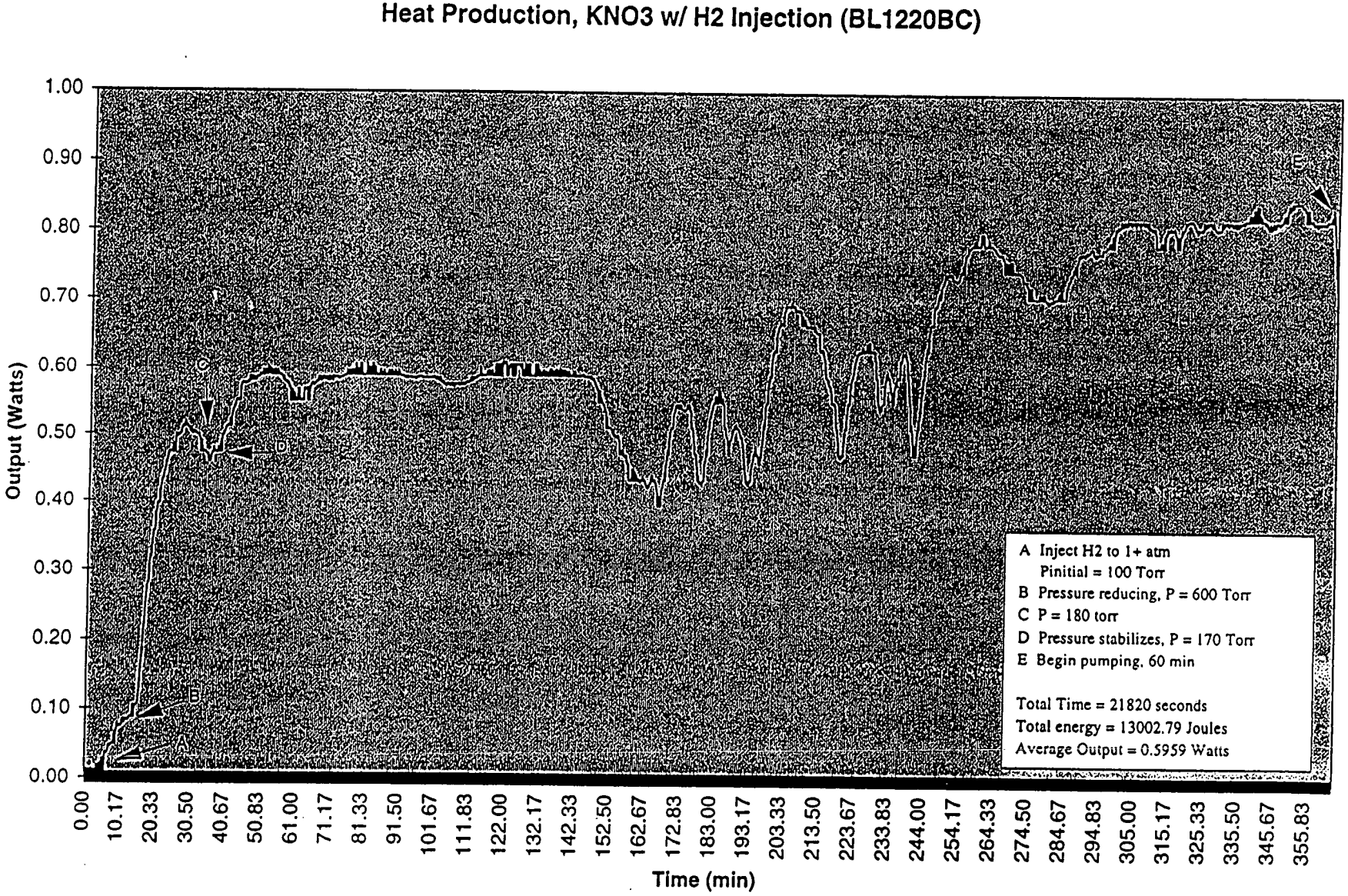

Heat Production, KNO3 w/ H2 Injection (BL1220BC)
Output (Watts)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
10.17
20.33
30.50
40.67
50.83
61.00
71.17
81.33
91.50
101.67
111.83
122.00
132.17
142.33
152.50
162.67
172.83
183.00
193.17
203.33
213.50
223.67
233.83
244.00
254.17
264.33
274.50
284.67
294.83
305.00
315.17
325.33
335.50
345.67
355.83
Time (min)
A Inject H2 to 1+ atm
Pinitial = 100 Torr
B Pressure reducing, P = 600 Torr
C P = 180 torr
D Pressure stabilizes, P = 170 Torr
E Begin pumping, 60 min
Total Time = 21820 seconds
Total energy = 13002.79 Joules
Average Output = 0.5959 Watts

Figure 4

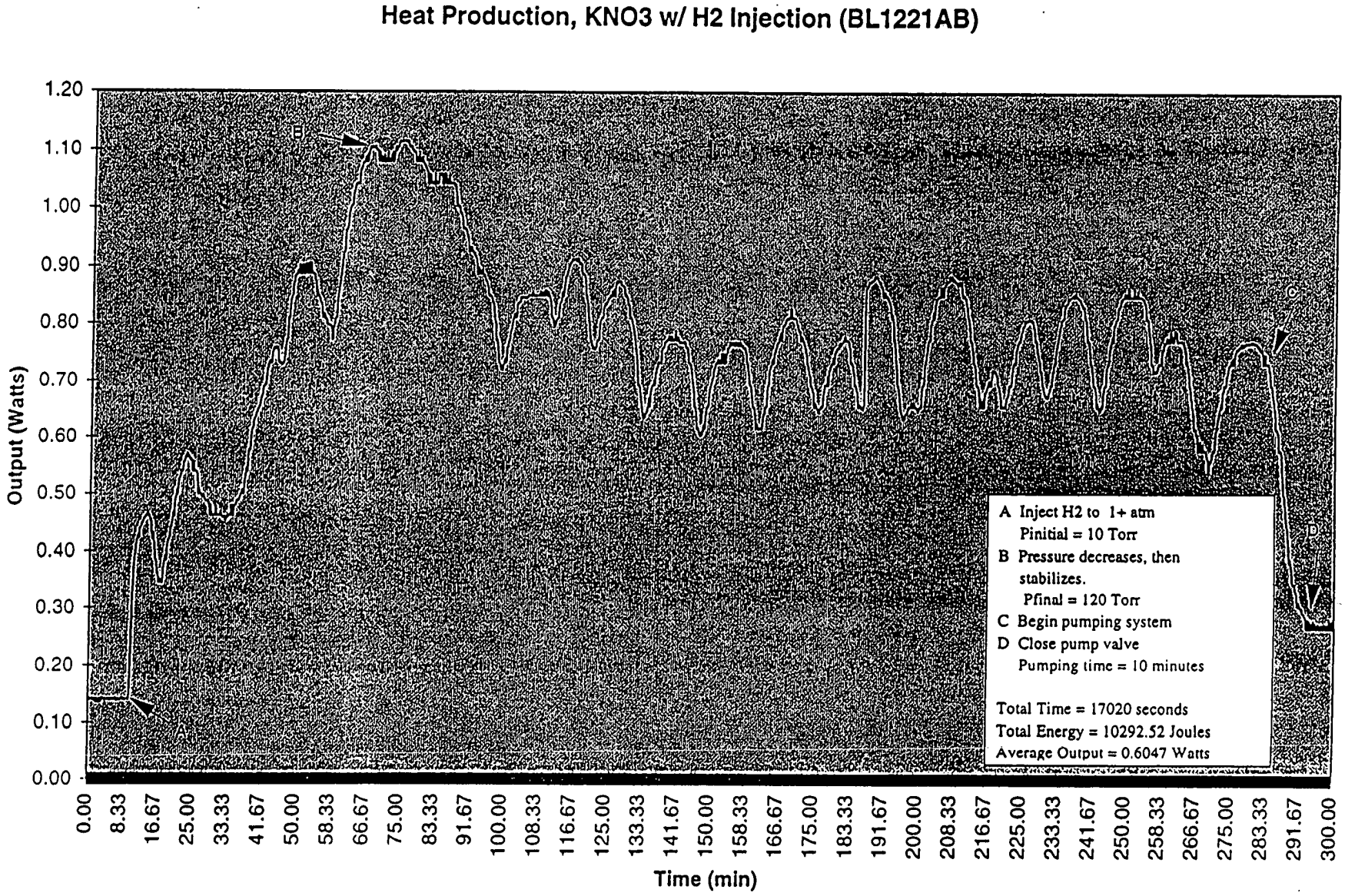

Heat Production, KNO3 w/ H2 Injection (BL1221AB)
Output (Watts)
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
8.33
16.67
25.00
33.33
41.67
50.00
58.33
66.67
75.00
83.33
91.67
100.00
108.33
116.67
125.00
133.33
141.67
150.00
158.33
166.67
175.00
183.33
191.67
200.00
208.33
216.67
225.00
233.33
241.67
250.00
258.33
266.67
275.00
283.33
291.67
300.00
Time (min)
A Inject H2 to 1+ atm
Pinitial = 10 Torr
B Pressure decreases, then stabilizes.
Pfinal = 120 Torr
C Begin pumping system
D Close pump valve
Pumping time = 10 minutes
Total Time = 17020 seconds
Total Energy = 10292.52 Joules
Average Output = 0.6047 Watts

Figure 5

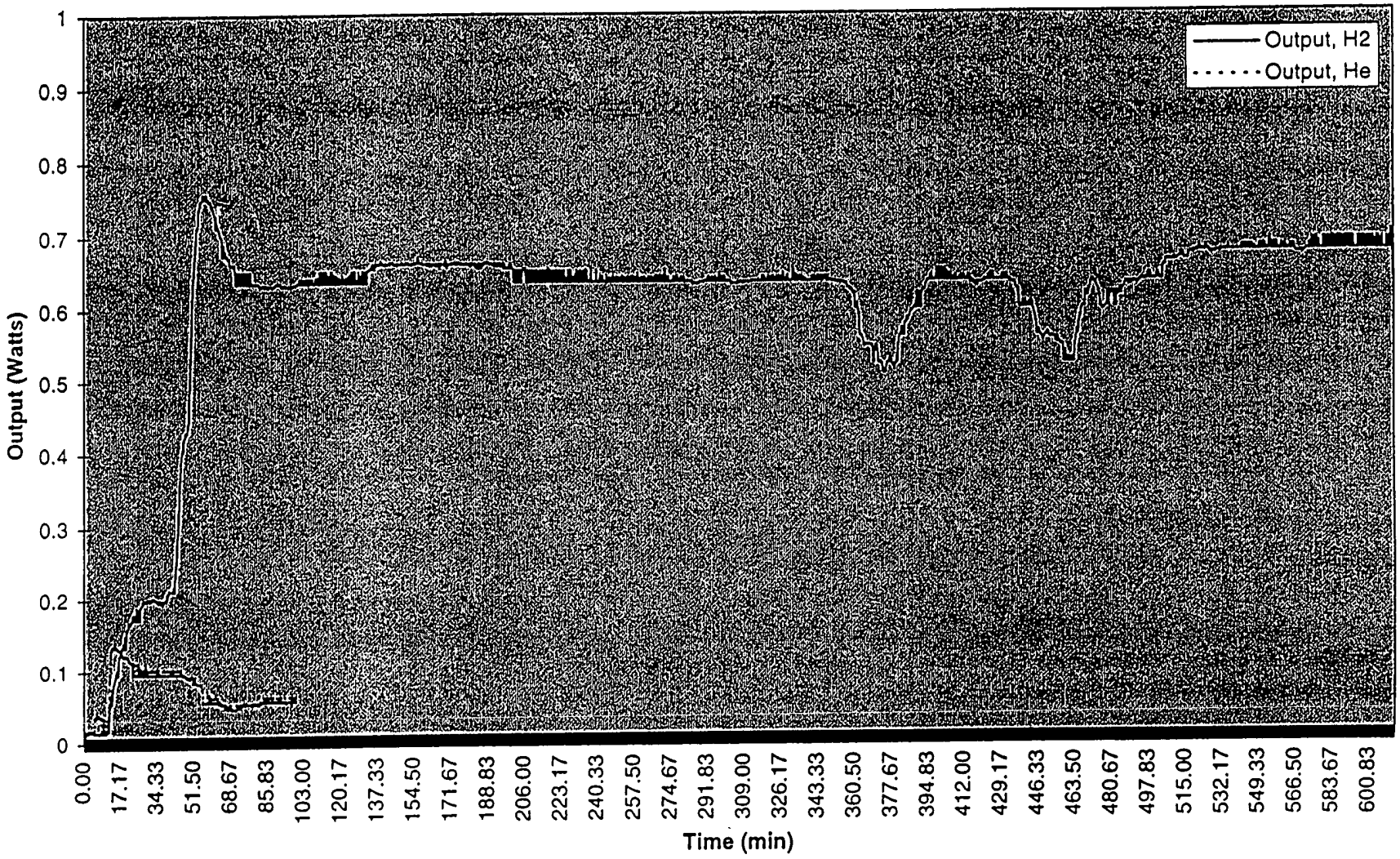

Heat Production, KNO3 w/ H2 and He Injection (BL1218CD,BL1219B)
Output, H2
Output, He
Output (Watts)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.00
17.17
34.33
51.50
68.67
85.83
103.00
120.17
137.33
154.50
171.67
188.83
206.00
223.17
240.33
257.50
274.67
291.83
309.00
326.17
343.33
360.50
377.67
394.83
412.00
429.17
446.33
463.50
480.67
497.83
515.00
532.17
549.33
566.50
583.67
600.83
Time (min)

Figure 6